

IN THE CLAIMS

Claim 1 (currently amended): A method for determining useful properties of individual building blocks of a material library comprising a substrate having at least two individual building blocks in at least two sections separated from one another, the method comprising:

introducing a starting material into the sections of the substrate to carry out a reaction of the starting material in the substrate sections in the presence of the corresponding building blocks, and obtaining, for each section, an effluent comprising at least one reaction product and/or starting material; and

analysing the effluent effluents in parallel by recording and analysing at least one photoacoustic signal.

Claim 2 (previously presented): The method according to Claim 1 further comprising:

establishing the material library comprising the substrate having the at least two individual building blocks in the at least two different sections of the substrate that are separated from one another.

Claim 3 (previously presented): The method according to Claim 1, wherein the analysing step includes:

modulating in time a light source generating monochromatic light; and detecting the photoacoustic signal with a microphone.

Claim 4 (previously presented): The method according to Claim 3, wherein the light source is a laser modulated in at least one of frequency and amplitude.

Claim 5 (previously presented): The method according to Claim 3, further comprising arranging the microphone above at least one of the sections.

Claim 6 (previously presented): The method according to Claim 2, wherein the establishing, introducing, and analysing steps are carried out in sequence.

Claim 7 (previously presented): The method according to Claim 1, wherein the introducing and analysing steps are carried out in parallel to one another.

Claim 8 (previously presented): The method according to Claim 1, wherein the substrate is a tube-bundle reactor or heat exchanger and the sections are channels.

Claim 9 (previously presented): The method according to Claim 1, wherein the individual building blocks have catalytic properties.

Claim 10 (previously presented): The method according to Claim 1, wherein the reaction is selected from the group consisting of decomposition of nitrogen oxides, synthesis of ammonia, ammonia oxidation, oxidation of hydrogen sulphide to sulphur, oxidation of sulphur dioxide, direct synthesis of methylchlorosilanes, oil refining, oxidative coupling of methane, methanol synthesis, hydrogenation of carbon monoxide and carbon dioxide, conversion of methanol to hydrocarbons, catalytic reforming, catalytic cracking and hydrocracking, carbon gasification and liquefaction, heterogeneous photocatalysis, synthesis of ethers, synthesis of MTBE, synthesis of TAME, isomerizations, alkylations, aromatizations, dehydrogenations, hydrogenations, hydroformylations, selective oxidations, partial oxidations, aminations, halogenations, nucleophilic aromatic substitutions, addition and elimination reactions, dimerizations, oligomerizations and metathesis, polymerizations, enantioselective catalysis, biocatalytic reactions, and combinations thereof.

Claim 11 (previously presented): The method according to Claim 1, further comprising:
determining the activity, selectivity, and/or long-term stability of building blocks that have catalytic properties.

Claim 12 (previously presented): The method according to Claim 4, wherein the light source is modulated by pulsing or chopping.

Claim 13 (previously presented): The method according to Claim 3, further comprising arranging a plurality of microphones, each microphone above a corresponding one of the sections.

Claim 14 (previously presented): The method according to Claim 3, further comprising arranging the microphone above the substrate.

Claim 15 (previously presented): The method according to Claim 2, wherein the establishing, introducing and analysing steps are carried out in parallel.

Claim 16 (previously presented): The method according to Claim 8, wherein the sections are tubes.

Claim 17 (previously presented): The method according to Claim 8, wherein the substrate is a block of a solid material having regions.

Claim 18 (previously presented): The method according to Claim 8, wherein the substrate is a block of a solid material having channels.

Claim 19 (previously presented): The method according to Claim 9, wherein the individual building blocks are heterogeneous catalysts and/or their precursors.

Claim 20 (previously presented): The method according to Claim 9, wherein the individual building blocks are inorganic heterogeneous catalysts and/or their precursors.

Claim 21 (previously presented): The method according to Claim 9, wherein the individual building blocks are solid catalysts or supported catalysts and/or their precursors.

Claim 22 (previously presented): The method according to Claim 9, wherein the individual building blocks are present as a catalyst bed.

Claim 23 (previously presented): The method according to Claim 9, wherein the individual building blocks are present as a tube-wall coating.

Claim 24 (previously presented): The method according to Claim 9, wherein the individual building blocks are present as an auxiliary support coating.

Claim 25 (previously presented): An apparatus for carrying out the method according to Claim 3, comprising:

a holder to hold at least two individual building blocks comprising a substrate having at least two different sections which are separated from one another;

an inlet to introduce a starting material;

a detector to detect photoacoustic signals; and

analysing electronics for analysing the photoacoustic signals.